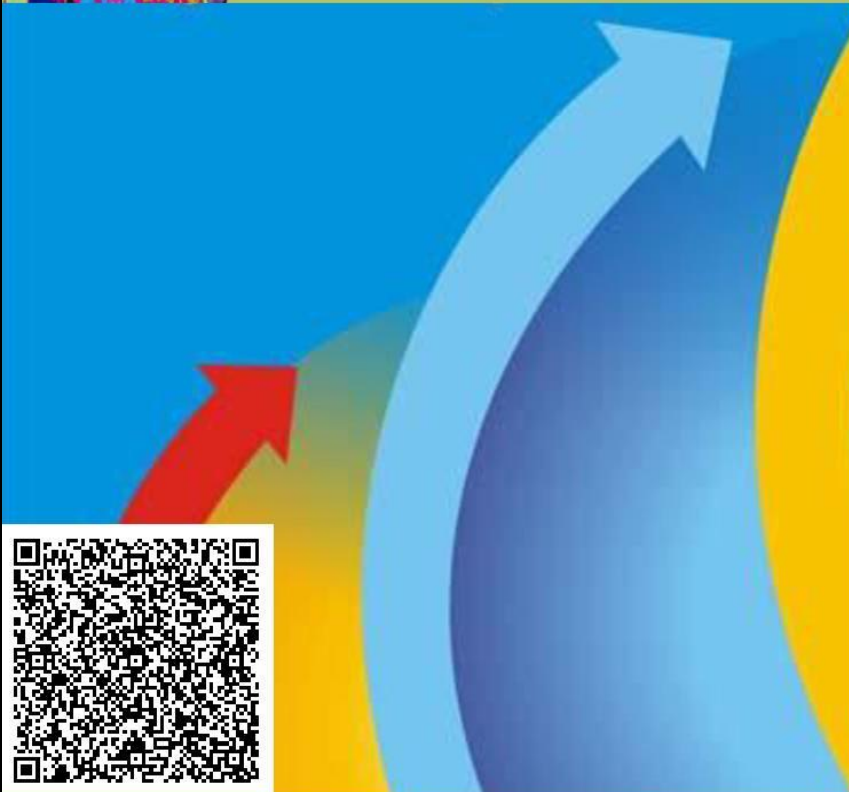




FUNDAMENTALS OF COMPUTER



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COMPUTER FUNDAMENTALS

Today's world is an information-rich world and it has become a necessity for everyone to know about computers. A computer is an electronic data processing device, which accepts and stores data input, processes the data input, and generates the output in a required format.

Computer

A computer is an electronic device, operating under the control of instructions stored in its own memory that can accept data (input), process the data according to specified rules, produce information (output), and store the information for future use¹.

The purpose of this tutorial is to introduce you to Computers and its fundamentals.

Functionalities of a Computer

If we look at it in a very broad sense, any digital computer carries out the following five functions –

Step 1 – Takes data as input.

Step 2 – Stores the data/instructions in its memory and uses them as required.

Step 3 – Processes the data and converts it into useful information.

Step 4 – Generates the output.

Step 5 – Controls all the above four steps.



Characteristics of Computer

Speed, accuracy, diligence, storage capability and versatility are some of the key characteristics of a computer. A brief overview of these characteristics are

- **Speed:** The computer can process data very fast, at the rate of millions of instructions per second. Some calculations that would have taken hours and days to complete otherwise, can be completed in a few seconds using the computer. For example, calculation and generation of salary slips of thousands of employees of an organization, weather forecasting that requires analysis of a large amount of data related to temperature, pressure and humidity of various places, etc.
- **Accuracy:** Computer provides a high degree of accuracy. For example, the computer can accurately give the result of division of any two numbers up to 10 decimal places.
- **Diligence:** When used for a longer period of time, the computer does not get tired or fatigued. It can perform long and complex calculations with the same speed and accuracy from the start till the end.
- **Storage Capability:** Large volumes of data and information can be stored in the computer and also retrieved whenever required. A limited amount of data can be stored, temporarily, in the primary memory. Secondary storage devices like floppy disk and compact disk can store a large amount of data permanently.

•**Versatility:** Computer is versatile in nature. It can perform different types of tasks with the same ease. At one moment you can use the computer to prepare a letter document and in the next moment you may play music or print a document. Computers have several limitations too. Computer can only perform tasks that it has been programmed to do. Computer cannot do any work without instructions from the user. It executes instructions as specified by the user and does not take its own decisions.

Advantages of Computers

Following are certain advantages of computers.

High Speed

- Computer is a very fast device.
- It is capable of performing calculation of very large amount of data.
- The computer has units of speed in microsecond, nanosecond, and even the picosecond.
- It can perform millions of calculations in a few seconds as compared to man who will spend many months to perform the same task.

Accuracy

- In addition to being very fast, computers are very accurate.
- The calculations are 100% error free.
- Computers perform all jobs with 100% accuracy provided that the input is correct.

Storage Capability

- Memory is a very important characteristic of computers.
- A computer has much more storage capacity than human beings.
- It can store large amount of data.
- It can store any type of data such as images, videos, text, audio, etc.

Diligence

- Unlike human beings, a computer is free from monotony, tiredness, and lack of concentration.
- It can work continuously without any error and boredom.
- It can perform repeated tasks with the same speed and accuracy.

Versatility

- A computer is a very versatile machine.
- A computer is very flexible in performing the jobs to be done.
- This machine can be used to solve the problems related to various fields.
- At one instance, it may be solving a complex scientific problem and the very next moment it may be playing a card game.

Reliability

- A computer is a reliable machine.
- Modern electronic components have long lives.
- Computers are designed to make maintenance easy.

Automation

- Computer is an automatic machine.

- Automation is the ability to perform a given task automatically. Once the computer receives a program i.e., the program is stored in the computer memory, then the program and instruction can control the program execution without human interaction.

Reduction in Paper Work and Cost

- The use of computers for data processing in an organization leads to reduction in paper work and results in speeding up the process.
- As data in electronic files can be retrieved as and when required, the problem of maintenance of large number of paper files gets reduced.
- Though the initial investment for installing a computer is high, it substantially reduces the cost of each of its transaction.

Disadvantages of Computers

Following are certain disadvantages of computers.

i)No I.Q.

- A computer is a machine that has no intelligence to perform any task.
- Each instruction has to be given to the computer.
- A computer cannot take any decision on its own.

ii)Dependency

- It functions as per the user's instruction; thus it is fully dependent on humans.

iii)Environment

- The operating environment of the computer should be dust free and suitable.

iv)No Feeling

- Computers have no feelings or emotions.
- It cannot make judgment based on feeling, taste, experience, and knowledge unlike humans.

COMPUTER APPLICATIONS

In this chapter, we will discuss the application of computers in various fields

A. Business

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.

Computer is used in business organizations for –

- Payroll calculations
- Budgeting
- Sales analysis
- Financial forecasting
- Managing employee database
- Maintenance of stocks, etc.

B.Banking



Today, banking is almost totally dependent on computers.

Banks provide the following facilities –

- Online accounting facility, which includes checking current balance, making deposits and overdrafts, checking interest charges, shares, and trustee records.
- ATM machines which are completely automated are making it even easier for customers to deal with banks.

C. Insurance

Insurance companies are keeping all records up-to-date with the help of computers. Insurance companies, finance houses, and stock broking firms are widely using computers for their concerns.

Insurance companies are maintaining a database of all clients with information showing –

- Procedure to continue with policies
- Starting date of the policies
- Next due installment of a policy
- Maturity date
- Interests due
- Survival benefits
- Bonus



D. Education

The computer helps in providing a lot of facilities in the education system.

- The computer provides a tool in the education system known as CBE (Computer Based Education).
- CBE involves control, delivery, and evaluation of learning.
- Computer education is rapidly increasing the graph of number of computer students.
- There are a number of methods in which educational institutions can use a computer to educate the students.
- It is used to prepare a database about performance of a student and analysis is carried out on this basis.



E. Marketing

In marketing, uses of the computer are following –

- **Advertising** – With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
- **Home Shopping** – Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.



F. Communication

Communication is a way to convey a message, an idea, a picture, or speech that is received and understood clearly and correctly by the person for whom it is meant. Some main areas in this category are –

- E-mail
- Chatting
- Usenet
- FTP
- Telnet
- Video-conferencing



G. Government

Computers play an important role in government services. Some major fields in this category are –

- Budgets
- Sales tax department
- Income tax department
- Computation of male/female ratio
- Computerization of voters lists
- Computerization of PAN card
- Weather forecasting



H. Engineering Design

Computers are widely used for Engineering purpose.

One of the major areas is CAD (Computer Aided Design) that provides creation and modification of images. Some of the fields are –

i) Structural Engineering – Requires stress and strain analysis for design of ships, buildings, bridges, airplanes, etc.

ii) Industrial Engineering – Computers deal with design, implementation, and improvement of



integrated systems of people, materials, and equipment.

iii)Architectural Engineering – Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

I. Healthcare

Computers have become an important part in hospitals, labs, and dispensaries. They are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, ultrasounds and CT scans, etc. are also done by computerized machines.

Following are some major fields of health care in which computers are used.



- **Diagnostic System** – Computers are used to collect data and identify the cause of illness.
- **Lab-diagnostic System** – All tests can be done and the reports are prepared by computer.
- **Patient Monitoring System** – These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- **Pharma Information System** – Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- **Surgery** – Nowadays, computers are also used in performing surgery.

Computer - Generations

Generation in computer terminology is a change in technology a computer is/was being used. Initially, the generation term was used to distinguish between varying hardware technologies. Nowadays, generation includes both hardware and software, which together make up an entire computer system.

There are five computer generations known till date. Each generation has been discussed in detail along with their time period and characteristics. In the following table, approximate dates against each generation has been mentioned, which are normally accepted.

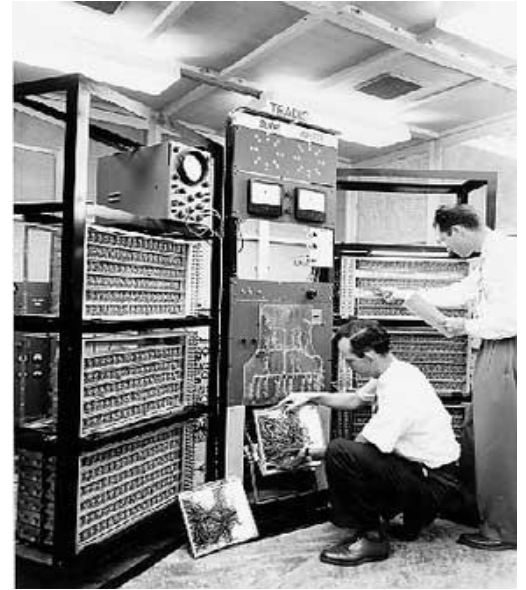
Following are the main five generations of computers.

SL. No	Generation & Description
1	<u>First Generation</u> The period of first generation: 1942-1954. Vacuum tube based.
2	<u>Second Generation</u> The period of second generation: 1952-1964. Transistor based.
3	<u>Third Generation</u> The period of third generation: 1964-1972. Integrated Circuit based.
4	<u>Fourth Generation</u> The period of fourth generation: 1972-1990. VLSI microprocessor based.

1.First Generation

The period of first generation was 1942-1954.

First generation of computer started with using vacuum tubes as the basic components for memory and circuitry for CPU(Central Processing Unit). These tubes like electric bulbs produced a lot of heat and were prone to frequent fusing of the installations, therefore, were very expensive and could be afforded only by very large organizations. In this generation mainly batch processing operating system were used. In this generation Punched cards, Paper tape, Magnetic tape Input & Output device were used. There were Machine code and electric wired board languages used.

**The main features of First Generation are:**

I) Vacuum tube technology II) Unreliable III) Supported Machine language only IV) Very costly V) Generate lot of heat VI) Slow Input/output device VII) Huge size VIII) Need of A.C. IX) Non portable X) Consumed lot of electricity

Some computer of this generation were:

• ENIAC • EDVAC • UNIVAC • IBM-701 • IBM-650

2.Second Generation

The period of second generation was 1952-1964. This generation using the transistor were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices. In this generation assembly language and high level programming language like FORTRAN, COBOL were used. There were Batch processing and Multiprogramming Operating system used.

**The main features of Second Generation are:**

i) Use of transistors ii) Reliable as compared to First generation computers iii) Smaller size as compared to First generation computers iv) Generate less heat as compared to First generation computers v) Consumed less electricity as compared to First generation computers vi) Faster than first generation computers vii) Still very costly viii) A.C. needed ix) Support machine and assembly languages.

Some computer of this generation were:

• IBM 1620 • IBM 7094 • CDC 1604 • CDC 3600 • UNIVAC 1108

3.Third Generation

The period of third generation was 1964-1972.

The third generation of computer is marked by the use of Integrated Circuits (IC's) in place of transistors. A single I.C has many transistors, resistors and capacitors along with the associated circuitry. The I.C was invented by Jack Kilby. This development made computers smaller in size, reliable and efficient. In this generation Remote processing, Time-sharing, Real-time, Multi-programming Operating System were used. High level language (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.



The main features of Third Generation are:

i) IC used ii) More reliable iii) Smaller size iv) Generate less heat v) Faster vi) Lesser maintenance vii) Still costly viii) A.C needed ix) Consumed lesser electricity x) Support high level language.

Some computer of this generation were:

• IBM-360 series • Honeywell-6000 series • PDP (Personal Data Processor) • IBM-370/168 • TDC-316

4.Fourth Generation

The period of Fourth Generation was 1972-1990. The fourth generation of computers is marked by the use of Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth Generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution. In this generation Time sharing, Real time, Networks, Distributed Operating System were used. All the Higher level languages like C and C++, DBASE etc. were used in this generation.



The main features of Fourth Generation are:

• VLSI technology used • Very cheap • Portable and reliable • Use of PC's • Very small size • Pipeline processing • No A.C. needed • Concept of internet was introduced • Great developments in the fields of networks • Computers became easily available

Some computer of this generation were:

• DEC 10 • STAR 1000 • PDP 11 • CRAY-1(Super Computer) • CRAY-X-MP (Super Computer)

5.Fifth Generation

The period of Fifth Generation is 1990-till date. In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components. This generation is based on

parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings. All the Higher level languages like C and C++, Java, .Net etc. are used in this generation.

AI includes: • Robotics • Neural networks • Game Playing • Development of expert systems to make decisions in real life situations. • Natural language understanding and generation.

The main features of Fifth Generation are:

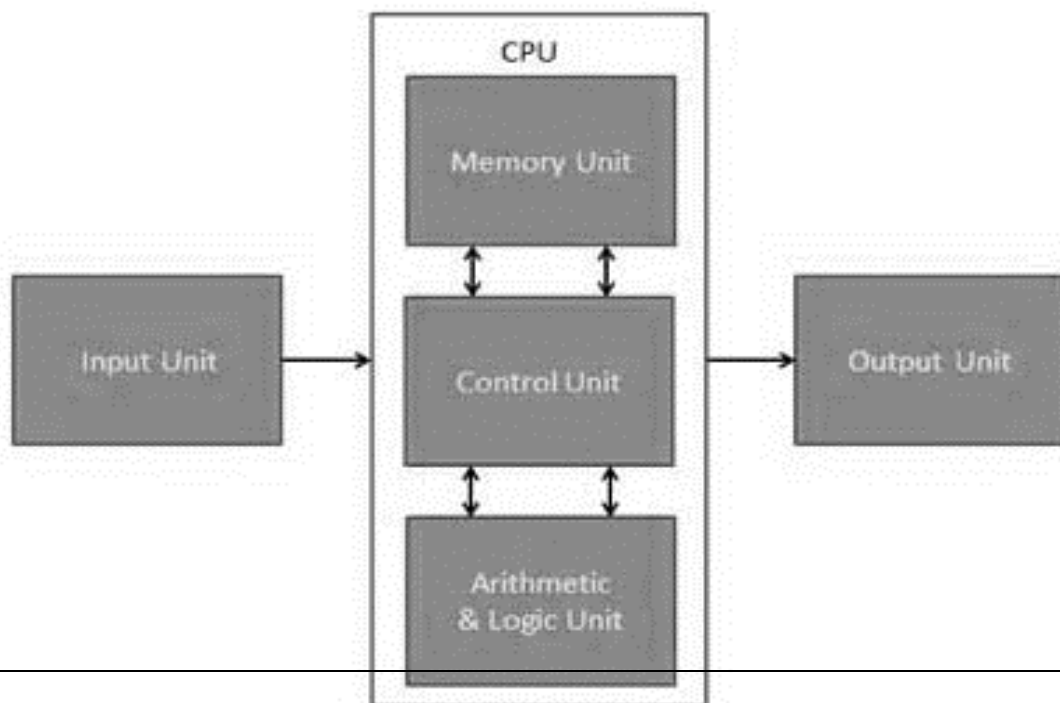
i)ULSI technology ii) Development of true artificial intelligence iii) Development of Natural language processing iv) Advancement in Parallel Processing v) Advancement in Superconductor technology vi) More user friendly interfaces with multimedia features vii) Availability of very powerful and compact computers at cheaper rates.

Some computer types of this generation are: • Desktop • Laptop • Notebook • Ultrabook

Computer - Components

All types of computers follow the same basic logical structure and perform the following five basic operations for converting raw input data into information useful to their users.

Sl.No.	Operation	Description
1	Take Input	The process of entering data and instructions into the computer system.
2	Store Data	Saving data and instructions so that they are available for processing as and when required.
3	Processing Data	Performing arithmetic, and logical operations on data in order to convert them into useful information.
4	Output Information	The process of producing useful information or results for the user, such as a printed report or visual display.
5	Control the workflow	Directs the manner and sequence in which all of the above operations are performed.



Input Unit

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.

CPU (Central Processing Unit)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results, and instructions (program). It controls the operation of all parts of the computer.

CPU itself has the following three components –

- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

Output Unit

The output unit consists of devices with the help of which we get the information from the computer. This unit is a link between the computer and the users. Output devices translate the computer's output into a form understandable by the users.

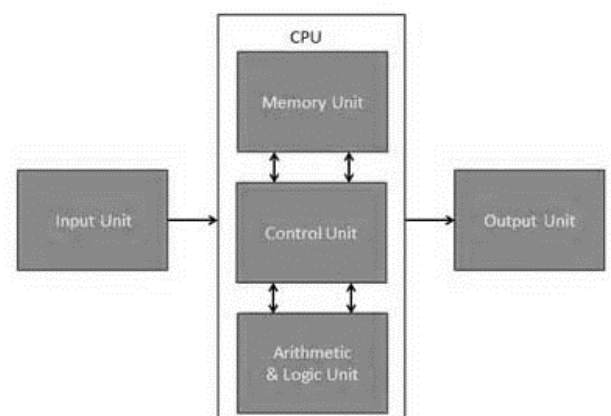
Central Processing Unit (CPU) consists of the following features –

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate results, and instructions (program).
- It controls the operation of all parts of the computer.



CPU itself has following three components.

- Memory or Storage Unit
- Control Unit
- ALU(Arithmetic Logic Unit)



Memory or Storage Unit

This unit can store instructions, data, and intermediate results. This unit supplies information to other units of the computer when needed. It is also known as internal storage unit or the main memory or the primary storage or Random Access Memory (RAM).

Its size affects speed, power, and capability. Primary memory and secondary memory are two types of memories in the computer. Functions of the memory unit are –

- It stores all the data and the instructions required for processing.
- It stores intermediate results of processing.
- It stores the final results of processing before these results are released to an output device.
- All inputs and outputs are transmitted through the main memory.

Control Unit

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

Functions of this unit are –

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input/output devices for transfer of data or results from storage.
- It does not process or store data.

ALU (Arithmetic Logic Unit)

This unit consists of two subsections namely,

- Arithmetic Section
- Logic Section

Arithmetic Section

Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.

Logic Section

Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.

COMPUTER TYPES

Computers can be broadly classified by their speed and computing power.

Sl.No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor

2	Workstation	It is also a single user computer system, similar to personal computer however has a more powerful microprocessor.
3	Mini Computer	It is a multi-user computer system, capable of supporting hundreds of users simultaneously.
4	Main Frame	It is a multi-user computer system, capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
5	Supercomputer	It is an extremely fast computer, which can execute hundreds of millions of instructions per second.

PC (Personal Computer)

A PC can be defined as a small, relatively inexpensive computer designed for an individual user. PCs are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is playing games and surfing the Internet.



Although personal computers are designed as single-user systems, these systems are normally linked together to form a network. In terms of power, now-a-days high-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and Dell.

Workstation

Workstation is a computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other such types of applications which require a moderate amount of computing power and relatively high quality graphics capabilities.

Workstations generally come with a large, high-resolution graphics screen, large amount of RAM, inbuilt network support, and a graphical user interface. Most workstations also have mass storage device such as a disk drive, but a special type of workstation, called diskless workstation, comes without a disk drive.

Common operating systems for workstations are UNIX and Windows NT. Like PC, workstations are also



single-user computers like PC but are typically linked together to form a local-area network, although they can also be used as stand-alone systems.

Minicomputer

It is a midsize multi-processing system capable of supporting up to 250 users simultaneously.

Mainframe

Mainframe is very large in size and is an expensive computer capable of supporting hundreds or even thousands of users simultaneously. Mainframe executes many programs concurrently and supports many simultaneous execution of programs.



Supercomputer

Supercomputers are one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amount of mathematical calculations (number crunching).



For example, weather forecasting, scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting).

COMPUTER -INPUT DEVICES

Following are some of the important input devices which are used in a computer –

i)Keyboard ii) Mouseiii) Joy Stick iv) Light pen v) Track Ball vi) Scannervi) Graphic Tablet vii)Microphone viii)Magnetic Ink Card Reader(MICR) ix)Optical Character Reader(OCR) x)Bar Code Reader xi)Optical Mark Reader(OMR)

Keyboard

Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions. Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.



The keys on the keyboard are as follows –

Sl. No	Keys & Description
1	Typing Keys These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
2	Numeric Keypad It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
3	Function Keys The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.
4	Control keys These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5	Special Purpose Keys Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

Mouse

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.



Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.

Advantages

- Easy to use
- Not very expensive
- Moves the cursor faster than the arrow keys of the keyboard.

Joystick

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at



its

both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

Light Pen

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube. When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.



Track Ball

Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved. Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button, or a square.



Scanner

Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation. Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.



Digitizer

Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at. Digitizer is also known as Tablet or Graphics Tablet as it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for fine works of drawing and image manipulation applications.



Microphone

Microphone is an input device to input sound that is then stored in a digital form. The microphone is used for various applications such as adding sound to a multimedia presentation or for mixing music.



Magnetic Ink Card Reader(MICR)

MICR input device is generally used in banks as there are large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable. This reading process is called Magnetic Ink Character Recognition (MICR). The main advantages of MICR is that it is fast and less error prone.



Optical Character Reader (OCR)

OCR is an input device used to read a printed text.

OCR scans the text optically, character by character, converts them into a machine readable code, and stores the text on the system memory.



Bar Code Readers

Bar Code Reader is a device used for reading bar coded data (data in the form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a handheld scanner or may be embedded in a stationary scanner. Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer that the bar code reader is connected to.



Optical Mark Reader (OMR)

OMR is a special type of optical scanner used to recognize the type of mark made by pen or pencil. It is used where one out of a few alternatives is to be selected and marked. It is specially used for checking the answer sheets of examinations having multiple choice questions.



Computer - Output Devices

Following are some of the important output devices used in a computer.

- Monitors
- Graphic Plotter
- Printer

Monitors

Monitors, commonly called as **Visual Display Unit (VDU)**, are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels. There are two kinds of viewing screen used for monitors.

- Cathode-Ray Tube (CRT)
- Flat-Panel Display

Cathode-Ray Tube (CRT) Monitor

The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form a whole character, such as the letter 'e' in the word help. A finite number of characters can be displayed on a screen at once. The screen can be divided into series of character boxes - fixed location on the screen where standard character can be placed. Most screens are capable displaying 80 characters of data horizontally and 25 lines vertically.



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There are some disadvantages of CRT – i) Large in Size ii) High power consumption

Flat-Panel Display Monitor

The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT. You can hang them on walls or wear them on your wrists. Current uses of flat-panel display include calculators, video games, monitors, laptop computer, and graphics display.

The flat-panel display is divided into two categories –

- **Emissive Displays** – Emissive displays are devices that convert electrical energy into light. For example, plasma panel and LED (Light-Emitting Diodes).
- **Non-Emissive Displays** – Non-emissive displays use optical effects to convert sunlight or light from some other source into graphics patterns. For example, LCD (Liquid-Crystal Device).



Printers

Printer is an output device, which is used to print information on paper. There are two types of printers – i) Impact Printers ii) Non-Impact Printers

Impact Printers

Impact printers print the characters by striking them on the ribbon, which is then pressed on the paper. Characteristics of Impact Printers are the following –

- Very low consumable costs
- Very noisy
- Useful for bulk printing due to low cost
- There is physical contact with the paper to produce an image

These printers are of two types –

- Character printers
- Line printers

Character Printers

Character printers are the printers which print one character at a time. These are further divided into two types:

- Dot Matrix Printer(DMP)
- Daisy Wheel

Dot Matrix Printer

In the market, one of the most popular printers is Dot Matrix Printer. These printers are popular because of their ease of printing and economical price. Each character printed is in the form of pattern of dots and head consists of a Matrix of Pins of size (5*7, 7*9, 9*7 or 9*9) which come out to form a character which is why it is called Dot Matrix Printer.



Advantages : i)Inexpensive ii)Widely Used iii)Other language characters can be printed

Disadvantages : i)Slow Speed ii)Poor Quality

Daisy Wheel

Head is lying on a wheel and pins corresponding to characters are like petals of Daisy (flower) which is why it is called Daisy Wheel Printer. These printers are generally used for word-processing in offices that require a few letters to be sent here and there with very nice quality.



Advantages: i) More reliable than DMP ii) Better quality iii) Fonts of character can be easily changed

Disadvantages: i)Slower than DMP ii)Noisy iii)More expensive than DMP

Line Printers

Line printers are the printers which print one line at a time.

These are of two types – i) Drum Printer ii) Chain Printer

Drum Printer

This printer is like a drum in shape hence it is called drum printer. The surface of the drum is divided into a number of tracks. Total tracks are equal to the size of the paper, i.e. for a paper width of 132 characters, drum will have 132 tracks. A character set is embossed on the track. Different character sets available in the market are 48-character set, 64 and 96 characters set. One rotation of drum prints one line. Drum printers are fast in speed and can print 300 to 2000 lines per minute.

Advantages i) Very high speed

Disadvantages i) Very expensive ii) Characters fonts cannot be changed

Chain Printer

In this printer, a chain of character sets is used, hence it is called Chain Printer. A standard character set may have 48, 64, or 96 characters.

Advantages i) Character fonts can easily be changed. ii) Different languages can be used with the same printer.

Disadvantages i) Noisy

Non-impact Printers

Non-impact printers print the characters without using the ribbon. These printers print a complete page at a time, thus they are also called as Page Printers.

These printers are of two types – i) Laser Printers ii) Inkjet Printers

Characteristics of Non-Impact Printers

i) Faster than impact printers ii) They are not noisy iii) High quality iv) Supports many fonts and different character size

Laser Printers

These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page.

Advantages : i) Very high speed ii) Very high quality output iii) Good graphics quality iv) Supports many fonts and different character size

Disadvantages

i) Expensive ii) Cannot be used to produce multiple copies of a document in a single printing

Inkjet Printers

Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper.



Inkjet printers produce high quality output with presentable features. They make less noise because no hammering is done and these have many styles of printing modes available. Color printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

Advantages

i) High quality printing ii) More reliable

Disadvantages

i) Expensive as the cost per page is high ii) Slow as compared to laser printer

Computer – Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory unit has $64 * 1024 = 65536$ memory locations. The address of these locations varies from 0 to 65535.

Memory is primarily of three types – i) Cache Memory ii) Primary Memory/Main Memory iii) Secondary Memory

Cache Memory

Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.



Advantages

The advantages of cache memory are as follows –

- i) Cache memory is faster than main memory.
- ii) It consumes less access time as compared to main memory.
- iii) It stores the program that can be executed within a short period of time.
- iv) It stores data for temporary use.

Disadvantages

The disadvantages of cache memory are as follows –

- i) Cache memory has limited capacity.
- ii) It is very expensive.

Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which the computer is currently working. It has a limited capacity and data is lost



when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed resides in the main memory. It is divided into two subcategories RAM and ROM.

Characteristics of Main Memory

- These are semiconductor memories.
- It is known as the main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is the working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without the primary memory.

Secondary Memory

This type of memory is also known as external memory or non-volatile. It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.



Characteristics of Secondary Memory

- i) These are magnetic and optical memories.
- ii) It is known as the backup memory.
- iii) It is a non-volatile memory.
- iv) Data is permanently stored even if power is switched off.
- v) It is used for storage of data in a computer.
- vi) Computer may run without the secondary memory.
- vii) Slower than primary memories.

DIFFERENCE BETWEEN PRIMARY & SECONDARY MEMORY

BASIS FOR COMPARISON	PRIMARY MEMORY	SECONDARY MEMORY
Basic	Primary memory is directly accessible by Processor/CPU.	Secondary memory is not directly accessible by CPU.
Altered Name	Main memory.	Auxiliary memory.
Data	Instructions or data to be currently executed are copied to main memory.	Data to be permanently stored is kept in secondary memory.
Volatility	Primary memory is usually volatile.	Secondary memory is non-volatile.
Formation	Primary memories are made of semiconductors.	Secondary memories are made of magnetic and optical material.

Access Speed	Accessing data from primary memory is faster.	Accessing data from secondary memory is slower.
Access	Primary memory is accessed by the data bus.	Secondary memory is accessed by input-output channels.
Size	The computer has a small primary memory.	The computer has a larger secondary memory.
Expense	Primary memory is costlier than secondary memory.	Secondary memory is cheaper than primary memory
Memory	Primary memory is an internal memory.	Secondary memory is an external memory.

Random Access Memory

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

Access time in RAM is independent of the address, that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup Uninterruptible Power System (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types – i) Static RAM (SRAM) ii) Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis. There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

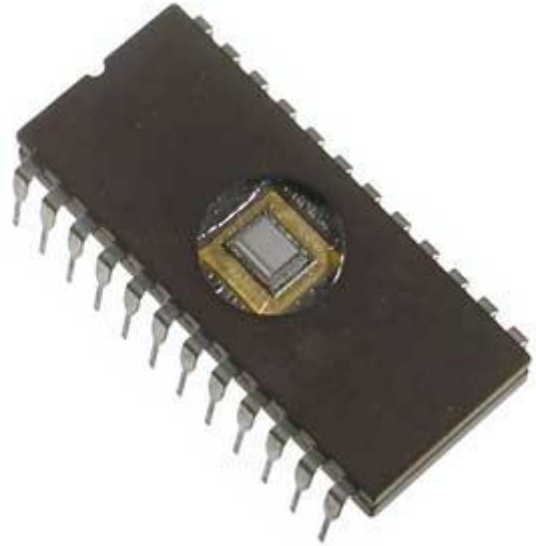
Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.



Computer - Read Only Memory

ROM stands for **Read Only Memory**. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.



Let us now discuss the various types of ROMs.

i) MROM (Masked ROM)

The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kind of ROMs are known as masked ROMs, which are inexpensive.

ii) PROM (Programmable Read Only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

iii) EPROM (Erasable and Programmable Read Only Memory)

EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming, an electrical charge is trapped in an insulated gate region. The charge is retained for more than 10 years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal window (lid). This exposure to ultra-violet light dissipates the charge. During normal use, the quartz lid is sealed with a sticker.

iv) EEPROM (Electrically Erasable and Programmable Read Only Memory)

EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (millisecond). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of reprogramming is flexible but slow.

Computer - Motherboard

The motherboard serves as a single platform to connect all of the parts of a computer together. It connects the CPU, memory, hard drives, optical drives, video card, sound card, and other ports and



expansion cards directly or via cables. It can be considered as the backbone of a computer.

Features of Motherboard

A motherboard comes with following features –

- Motherboard varies greatly in supporting various types of components.
- Motherboard supports a single type of CPU and few types of memories.
- Video cards, hard disks, sound cards have to be compatible with the motherboard to function properly.
- Motherboards, cases, and power supplies must be compatible to work properly together.

Popular Manufacturers

Following are the popular manufacturers of the motherboard.

i)Intel ii)ASUS iii)AOpen iv)ABIT v)Biostar vi)Gigabyte vii)MSI

Description of Motherboard

The motherboard is mounted inside the case and is securely attached via small screws through pre-drilled holes. Motherboard contains ports to connect all of the internal components. It provides a single socket for CPU, whereas for memory, normally one or more slots are available. Motherboards provide ports to attach the floppy drive, hard drive, and optical drives via ribbon cables. Motherboard carries fans and a special port designed for power supply.

There is a peripheral card slot in front of the motherboard using which video cards, sound cards, and other expansion cards can be connected to the motherboard.

On the left side, motherboards carry a number of ports to connect the monitor, printer, mouse, keyboard, speaker, and network cables. Motherboards also provide USB ports, which allow compatible devices to be connected in plug-in/plug-out fashion. For example, pen drive, digital cameras, etc.

Computer - Memory Units

Memory unit is the amount of data that can be stored in the storage unit. This storage capacity is expressed in terms of Bytes.

The following table explains the main memory storage units –

Sl.No.	Unit & Description
1	Bit (Binary Digit) A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
2	Nibble A group of 4 bits is called nibble.
3	Byte A group of 8 bits is called byte. A byte is the smallest unit, which can represent a data item or a character.
4	Word A computer word, like a byte, is a group of fixed number of bits processed as a unit, which varies from computer to computer but is fixed for each computer. The length of a computer word is called word-size or word length. It may be as small as 8 bits or may be as long as 96 bits. A computer stores the information in the form of computer words.

The following table lists some higher storage units –

Sl.No.	Unit & Description
1	Kilobyte (KB) 1 KB = 1024 Bytes
2	Megabyte (MB) 1 MB = 1024 KB
3	GigaByte (GB) 1 GB = 1024 MB
4	TeraByte (TB) 1 TB = 1024 GB
5	PetaByte (PB) 1 PB = 1024 TB

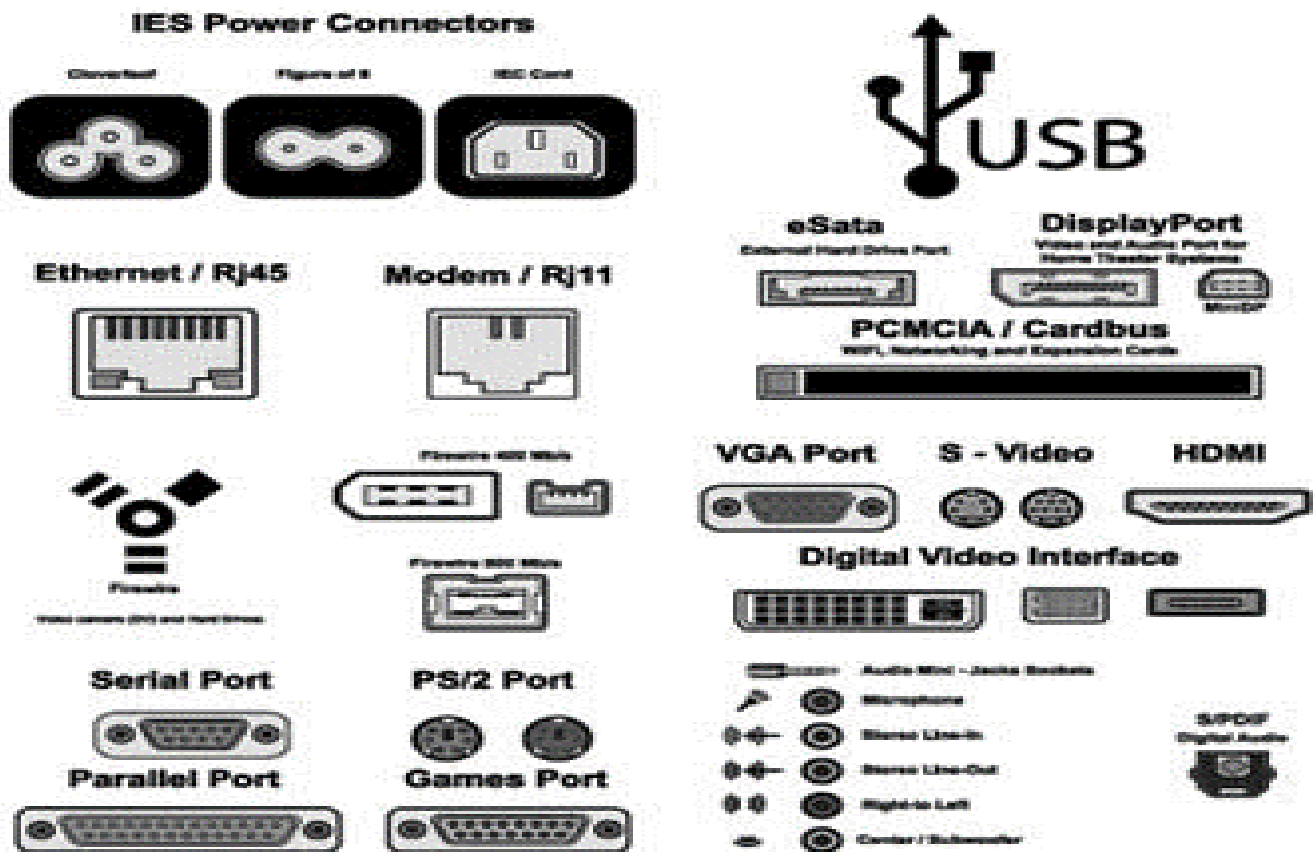
Computer - Ports

A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet.

Characteristics of Ports

A port has the following characteristics –

- External devices are connected to a computer using cables and ports.
- Ports are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.



Let us now discuss a few important types of ports –

Serial Port

- Used for external modems and older computer mouse
- Two versions: 9 pin, 25 pin model
- Data travels at 115 kilobits per second

Parallel Port

- Used for scanners and printers
- Also called printer port
- 25 pin model
- IEEE 1284-compliant Centronics port

PS/2 Port

- Used for old computer keyboard and mouse

- Also called mouse port
- Most of the old computers provide two PS/2 port, each for the mouse and keyboard
- IEEE 1284-compliant Centronics port

Universal Serial Bus (or USB) Port

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.
- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.
- Data travels at 12 megabits per seconds.
- USB compliant devices can get power from a USB port.

VGA Port

- Connects monitor to a computer's video card.
- It has 15 holes.
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.

Power Connector

- Three-pronged plug.
- Connects to the computer's power cable that plugs into a power bar or wall socket.

Fire wire Port

- Transfers large amount of data at very fast speed.
- Connects camcorders and video equipment to the computer.
- Data travels at 400 to 800 megabits per seconds.
- Invented by Apple.
- It has three variants: 4-Pin FireWire 400 connector, 6-Pin FireWire 400 connector, and 9-Pin FireWire 800 connector.

Modem Port

- Connects a PC's modem to the telephone network.

Ethernet Port

- Connects to a network and high speed Internet.
- Connects the network cable to a computer.
- This port resides on an Ethernet Card.
- Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.

Game Port

- Connect a joystick to a PC
- Now replaced by USB

Digital Video Interface, DVI port

- Connects Flat panel LCD monitor to the computer's high-end video graphic cards.
- Very popular among video card manufacturers.

Sockets

- Sockets connect the microphone and speakers to the sound card of the computer.

VGA Stands for "Video Graphics Array." It is the standard monitor or display interface used in most PCs. Therefore, if a monitor is VGA-compatible, it should work with most new computers. The VGA standard was originally developed by IBM in 1987 and allowed for a display resolution of 640x480 pixels. Since then, many revisions of the standard have been introduced. The most common is Super VGA (SVGA), which allows for resolutions greater than 640x480, such as 800x600 or 1024x768. A standard VGA connection has 15 pins and is shaped like a trapezoid.

SVGA

Super video graphics array (Super VGA or SVGA) is a high-resolution standard used to channel video data to a compatible visual output device - usually a computer monitor. This is actually a broad umbrella term for other computer display standards. Originally, it was just an extension to the VGA standard, which was a purely IBM-defined standard also known as ultra-video graphics array (UVGA).

XGA (Extended Graphics Array) is a high-resolution video display mode that provides screen pixel resolution of 1,024 by 768 in 256 colors or 640 by 480 in high (16-bit) color. XGA monitor s can be interlaced display s.

Computer - Hardware

Hardware:

Computer hardware is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.

Examples of Hardware are the following –

- **Input devices** – keyboard, mouse, etc.
- **Output devices** – printer, monitor, etc.
- **Secondary storage devices** – Hard disk, CD, DVD, etc.
- **Internal components** – CPU, motherboard, RAM, etc.



Relationship between Hardware and Software

- Hardware and software are mutually dependent on each other. Both of them must work together to make a computer produce a useful output.
- Software cannot be utilized without supporting hardware.

- Hardware without a set of programs to operate upon cannot be utilized and is useless.
- To get a particular job done on the computer, relevant software should be loaded into the hardware.
- Hardware is a one-time expense.
- Software development is very expensive and is a continuing expense.
- Different software applications can be loaded on a hardware to run different jobs.
- A software acts as an interface between the user and the hardware.
- If the hardware is the 'heart' of a computer system, then the software is its 'soul'. Both are complementary to each other.

Computer - Software

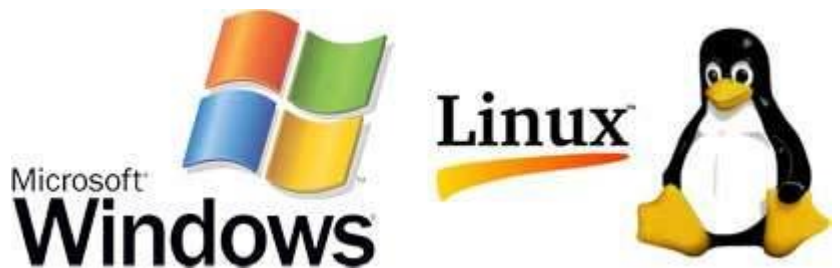
Software

Software is a generic term for organized collections of computer data and instructions, often broken into two major categories: system software that provides the basic non-task-specific functions of the computer, and application software which is used by users to accomplish specific tasks. There are two types of software –

- System Software
- Application Software

System Software

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users. Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.



Here is a list of some of the most prominent features of a system software –

i) Close to the system ii) Fast in speed iii) Difficult to design iv) Difficult to understand v) Less interactive vi) Smaller in size viii) Difficult to manipulate viii) Generally written in low-level language

Application Software

Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Application software may consist of a single program, such as Microsoft's notepad for writing and editing a simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package. Examples of Application software are the following –

i) Payroll Software ii) Student Record Software iii) Inventory Management Software iv) Income Tax Software v) Railways Reservation Software vi) Microsoft Office Suite Software vii) Microsoft Word viii) Microsoft Excel ix) Microsoft PowerPoint



Features of application software are as follows –

i) Close to the user ii) Easy to design iii) More interactive iv) Slow in speed v) Generally written in high-level language vi) Easy to understand vii) Easy to manipulate and use viii) Bigger in size and requires large storage space

Comparison Application Software and System Software		Application Software
Computer software, or just software is a general term primarily used for digitally stored data such as computer programs and other kinds of information read and written by computers. App comes under computer software though it has a wide scope now.		Application software, also known as an application or an "app", is computer software designed to help the user to perform specific tasks.
Example:	1) Microsoft Windows 2) Linux 3) Unix 4) Mac OSX 5) DOS	1) Opera (Web Browser) 2) Microsoft Word (Word Processing) 3) Microsoft Excel (Spreadsheet software) 4) MySQL (Database Software) 5) Microsoft PowerPoint (Presentation Software) 6) Adobe Photoshop (Graphics Software)
Interaction:	Generally, users do not interact with system software as it works in the background.	Users always interact with application software while doing different activities.

Dependency:	System software can run independently of the application software.	Application software cannot run without the presence of the system software.
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Computer Viruses

Viruses: A virus is a small piece of software that piggybacks on real programs. For example, a virus might attach itself to a program such as a spreadsheet program. Each time the spreadsheet program runs, the virus runs, too, and it has the chance to reproduce (by attaching to other programs) or wreak havoc.

- **E-mail viruses:** An e-mail virus travels as an attachment to e-mail messages, and usually replicates itself by automatically mailing itself to dozens of people in the victim's e-mail address book. Some e-mail viruses don't even require a double-click -- they launch when you view the infected message in the preview pane of your e-mail software [source: Johnson].
- **Trojan horses:** A Trojan horse is simply a computer program. The program claims to do one thing (it may claim to be a game) but instead does damage when you run it (it may erase your hard disk). Trojan horses have no way to replicate automatically.
- **Worms:** A worm is a small piece of software that uses computer networks and security holes to replicate itself. A copy of the worm scans the network for another machine that has a specific security hole. It copies itself to the new machine using the security hole, and then starts replicating from there, as well.

What are some tips to avoid viruses and lessen their impact?*

- i) Install anti-virus software from a reputable vendor. Update it and use it regularly.
- ii) In addition to scanning for viruses on a regular basis, install an "on access" scanner (included in most anti-virus software packages) and configure it to start each time you start up your computer. This will protect your system by checking for viruses each time you run an executable file.
- iii) Use a virus scan before you open any new programs or files that may contain executable code. This includes packaged software that you buy from the store as well as any program you might download from the Internet.
- iv) If you are a member of an online community or chat room, be very careful about accepting files or clicking links that you find or that people send you within the community.
- v) Make sure you back up your data (documents, bookmark files, important email messages, etc.) on disc so that in the event of a virus infection, you do not lose valuable work.

Computer - Number System

When we type some letters or words, the computer translates them in numbers as computers can understand only numbers. A computer can understand the positional number system where there are only a few symbols called digits and these symbols represent different values depending on the position they occupy in the number.

The value of each digit in a number can be determined using –

- The digit
- The position of the digit in the number

- The base of the number system (where the base is defined as the total number of digits available in the number system)

Decimal Number System

The number system that we use in our day-to-day life is the decimal number system. Decimal number system has base 10 as it uses 10 digits from 0 to 9. In decimal number system, the successive positions to the left of the decimal point represent units, tens, hundreds, thousands, and so on.

Each position represents a specific power of the base (10). For example, the decimal number 1234 consists of the digit 4 in the units position, 3 in the tens position, 2 in the hundreds position, and 1 in the thousands position. Its value can be written as

$$\begin{aligned} &(1 \times 1000) + (2 \times 100) + (3 \times 10) + (4 \times 1) \\ &(1 \times 10^3) + (2 \times 10^2) + (3 \times 10^1) + (4 \times 10^0) \\ &1000 + 200 + 30 + 4 \\ &1234 \end{aligned}$$

As a computer programmer or an IT professional, you should understand the following number systems which are frequently used in computers.

Sl.No.	Number System and Description
1	Binary Number System Base 2. Digits used : 0, 1
2	Octal Number System Base 8. Digits used : 0 to 7
3	Hexa Decimal Number System Base 16. Digits used: 0 to 9, Letters used : A- F

Binary Number System

Characteristics of the binary number system are as follows –

- Uses two digits, 0 and 1
- Also called as base 2 number system
- Each position in a binary number represents a **0** power of the base (2). Example 2^0
- Last position in a binary number represents a **x** power of the base (2). Example 2^x where **x** represents the last position - 1.

Example

Binary Number: 10101_2

Calculating Decimal Equivalent –

Step	Binary Number	Decimal Number
Step 1	10101_2	$((1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0))_{10}$
Step 2	10101_2	$(16 + 0 + 4 + 0 + 1)_{10}$
Step 3	10101_2	21_{10}

Note – 10101_2 is normally written as 10101.

Octal Number System

Characteristics of the octal number system are as follows –

- Uses eight digits, 0,1,2,3,4,5,6,7
- Also called as base 8 number system
- Each position in an octal number represents a **0** power of the base (8). Example 8^0
- Last position in an octal number represents a **x** power of the base (8). Example 8^x where **x** represents the last position - 1

Example

Octal Number: 12570_8

Calculating Decimal Equivalent –

Step	Octal Number	Decimal Number
Step 1	12570_8	$((1 \times 8^4) + (2 \times 8^3) + (5 \times 8^2) + (7 \times 8^1) + (0 \times 8^0))_{10}$
Step 2	12570_8	$(4096 + 1024 + 320 + 56 + 0)_{10}$
Step 3	12570_8	5496_{10}

Note – 12570_8 is normally written as 12570.

Hexadecimal Number System

Characteristics of hexadecimal number system are as follows –

- Uses 10 digits and 6 letters, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F
- Letters represent the numbers starting from 10. A = 10, B = 11, C = 12, D = 13, E = 14, F = 15
- Also called as base 16 number system
- Each position in a hexadecimal number represents a **0** power of the base (16). Example, 16^0
- Last position in a hexadecimal number represents a **x** power of the base (16). Example 16^x where **x** represents the last position - 1

Example

Hexadecimal Number: $19FDE_{16}$

Calculating Decimal Equivalent –

Step	Binary Number	Decimal Number
Step 1	$19FDE_{16}$	$((1 \times 16^4) + (9 \times 16^3) + (F \times 16^2) + (D \times 16^1) + (E \times 16^0))_{10}$
Step 2	$19FDE_{16}$	$((1 \times 16^4) + (9 \times 16^3) + (15 \times 16^2) + (13 \times 16^1) + (14 \times 16^0))_{10}$
Step 3	$19FDE_{16}$	$(65536 + 36864 + 3840 + 208 + 14)_{10}$

Step 4	19FDE ₁₆	106462 ₁₀
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Note – 19FDE₁₆ is normally written as 19FDE.

Computer - Number Conversion

There are many methods or techniques which can be used to convert numbers from one base to another. In this chapter, we'll demonstrate the following –

- Decimal to Other Base System
- Other Base System to Decimal
- Other Base System to Non-Decimal
- Shortcut method - Binary to Octal
- Shortcut method - Octal to Binary
- Shortcut method - Binary to Hexadecimal
- Shortcut method - Hexadecimal to Binary

Decimal to Other Base System

Step 1 – Divide the decimal number to be converted by the value of the new base.

Step 2 – Get the remainder from Step 1 as the rightmost digit (least significant digit) of the new base number.

Step 3 – Divide the quotient of the previous divide by the new base.

Step 4 – Record the remainder from Step 3 as the next digit (to the left) of the new base number.

Repeat Steps 3 and 4, getting remainders from right to left, until the quotient becomes zero in Step 3.

The last remainder thus obtained will be the Most Significant Digit (MSD) of the new base number.

Example

Decimal Number: 29₁₀

Calculating Binary Equivalent –

Step	Operation	Result	Remainder
Step 1	29 / 2	14	1
Step 2	14 / 2	7	0
Step 3	7 / 2	3	1
Step 4	3 / 2	1	1
Step 5	1 / 2	0	1

As mentioned in Steps 2 and 4, the remainders have to be arranged in the reverse order so that the first remainder becomes the Least Significant Digit (LSD) and the last remainder becomes the Most Significant Digit (MSD).

Decimal Number : 29_{10} = Binary Number : 11101_2 .

Other Base System to Decimal System

Step 1 – Determine the column (positional) value of each digit (this depends on the position of the digit and the base of the number system).

Step 2 – Multiply the obtained column values (in Step 1) by the digits in the corresponding columns.

Step 3 – Sum the products calculated in Step 2. The total is the equivalent value in decimal.

Example

Binary Number: 11101_2

Calculating Decimal Equivalent –

Step	Binary Number	Decimal Number
Step 1	11101_2	$((1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0))_{10}$
Step 2	11101_2	$(16 + 8 + 4 + 0 + 1)_{10}$
Step 3	11101_2	29_{10}

Binary Number : 11101_2 = Decimal Number : 29_{10}

Other Base System to Non-Decimal System

Step 1 – Convert the original number to a decimal number (base 10).

Step 2 – Convert the decimal number so obtained to the new base number.

Example

Octal Number : 25_8

Calculating Binary Equivalent –

Step 1 - Convert to Decimal

Step	Octal Number	Decimal Number
Step 1	25_8	$((2 \times 8^1) + (5 \times 8^0))_{10}$
Step 2	25_8	$(16 + 5)_{10}$
Step 3	25_8	21_{10}

Octal Number : 25_8 = Decimal Number : 21_{10}

Step 2 - Convert Decimal to Binary

Step	Operation	Result	Remainder
Step 1	$21 / 2$	10	1
Step 2	$10 / 2$	5	0
Step 3	$5 / 2$	2	1
Step 4	$2 / 2$	1	0
Step 5	$1 / 2$	0	1

Decimal Number : 21_{10} = Binary Number : 10101_2

Octal Number : 25_8 = Binary Number : 10101_2

Shortcut Method – Binary to Octal

Step 1 – Divide the binary digits into groups of three (starting from the right).

Step 2 – Convert each group of three binary digits to one octal digit.

Example

Binary Number: 10101_2

Calculating Octal Equivalent –

Step	Binary Number	Octal Number
Step 1	10101_2	010 101
Step 2	10101_2	2_8 5_8
Step 3	10101_2	25_8

Binary Number : 10101_2 = Octal Number : 25_8

Shortcut Method – Octal to Binary

Step 1 – Convert each octal digit to a 3-digit binary number (the octal digits may be treated as decimal for this conversion).

Step 2 – Combine all the resulting binary groups (of 3 digits each) into a single binary number.

Example

Octal Number : 25_8

Calculating Binary Equivalent –

Step	Octal Number	Binary Number
Step 1	25_8	2_{10} 5_{10}
Step 2	25_8	010_2 101_2
Step 3	25_8	010101_2

Octal Number : 25_8 = Binary Number : 10101_2

Shortcut Method – Binary to Hexadecimal

Step 1 – Divide the binary digits into groups of four (starting from the right).

Step 2 – Convert each group of four binary digits to one hexadecimal symbol.

Example

Binary Number : 10101_2

Calculating hexadecimal Equivalent –

Step	Binary Number	Hexadecimal Number
Step 1	10101_2	0001 0101
Step 2	10101_2	1_{16} 5_{16}

Step 3	10101 ₂	15 ₁₆
--------	--------------------	------------------

Binary Number : 10101₂ = Hexadecimal Number : 15₁₆

Shortcut Method - Hexadecimal to Binary

Step 1 – Convert each hexadecimal digit to a 4-digit binary number (the hexadecimal digits may be treated as decimal for this conversion).

Step 2 – Combine all the resulting binary groups (of 4 digits each) into a single binary number.

Example

Hexadecimal Number : 15₁₆

Calculating Binary Equivalent –

Step	Hexadecimal Number	Binary Number
Step 1	15 ₁₆	1 ₁₀ 5 ₁₀
Step 2	15 ₁₆	0001 ₂ 0101 ₂
Step 3	15 ₁₆	00010101 ₂

Computer - Data and Information

Data can be defined as a representation of facts, concepts, or instructions in a formalized manner, which should be suitable for communication, interpretation, or processing by human or electronic machine.

Data is represented with the help of characters such as alphabets (A-Z, a-z), digits (0-9) or special characters (+, -, /, *, <, >, = etc.)

What is Information?

Information is organized or classified data, which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based.

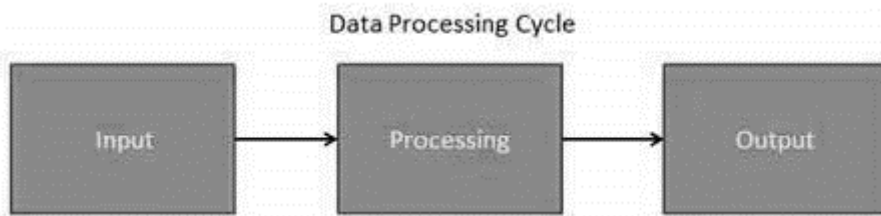
For the decision to be meaningful, the processed data must qualify for the following characteristics –

- **Timely** – Information should be available when required.
- **Accuracy** – Information should be accurate.
- **Completeness** – Information should be complete.

Data Processing Cycle

Data processing is the re-structuring or re-ordering of data by people or machine to increase their usefulness and add values for a particular purpose. Data processing consists of the following basic steps - input, processing, and output. These three steps constitute the data processing cycle.





- **Input** – In this step, the input data is prepared in some convenient form for processing. The form will depend on the processing machine. For

example, when electronic computers are used, the input data can be recorded on any one of the several types of input medium, such as magnetic disks, tapes, and so on.

- **Processing** – In this step, the input data is changed to produce data in a more useful form. For example, pay-checks can be calculated from the time cards, or a summary of sales for the month can be calculated from the sales orders.
- **Output** – At this stage, the result of the proceeding processing step is collected. The particular form of the output data depends on the use of the data. For example, output data may be pay-checks for employees.

Computer - Networking

A **computer network** is a system in which multiple computers are connected to each other to share information and resources.



Characteristics of a Computer Network

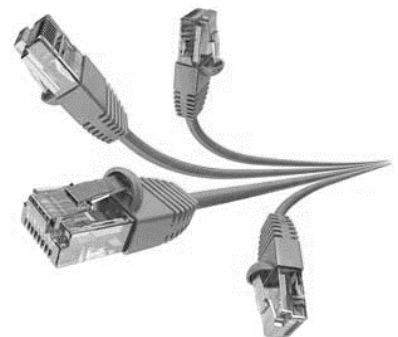
- Share resources from one computer to another.
- Create files and store them in one computer, access those files from the other computer(s) connected over the network.
- Connect a printer, scanner, or a fax machine to one computer within the network and let other computers of the network use the machines available over the network.

Following is the list of hardware's required to set up a computer network.

- Network Cables
- Distributors
- Routers
- Internal Network Cards
- External Network Cards

Network Cables

Network cables are used to connect computers. The most commonly used cable is Category 5 cable RJ-45.



Distributors



A computer can be connected to another one via a serial port but if we need to connect many computers to produce a network, this serial connection will not work.

The solution is to use a central body to which other computers, printers, scanners, etc. can be connected and then this body will manage or distribute network traffic.

Router

A router is a type of device which acts as the central point among computers and other devices that are a part of the network. It is equipped with holes called ports. Computers and other devices are connected to a router using network cables. Now-a-days router comes in wireless modes using which computers can be connected without any physical cable.



Network Card

Network card is a necessary component of a computer without which a computer cannot be connected over a network. It is also known as the network adapter or Network Interface Card (NIC). Most branded computers have network card pre-installed. Network cards are of two types: Internal and External Network Cards.

Internal Network Cards

Motherboard has a slot for internal network card where it is to be inserted. Internal network cards are of two types in which the first type uses Peripheral Component Interconnect (PCI) connection, while the second type uses Industry Standard Architecture (ISA). Network cables are required to provide network access.



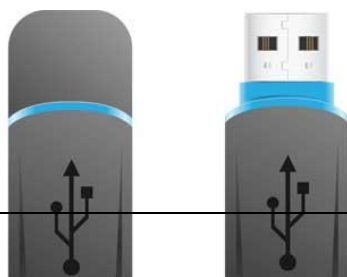
External Network Cards

External network cards are of two types: Wireless and USB based. Wireless network card needs to be inserted into the motherboard, however no network cable is required to connect to the network.



Universal Serial Bus (USB)

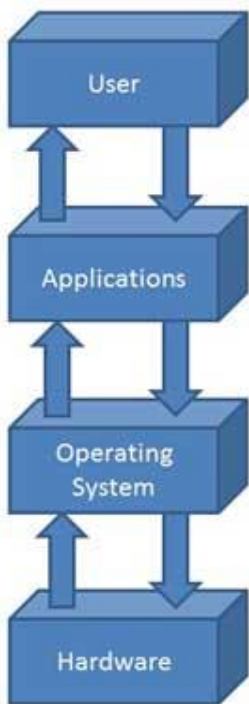
USB card is easy to use and connects via USB port. Computers automatically detect USB card and can install the drivers required to support the USB network card automatically.



Computer - Operating System

The Operating System is a program with the following features –

- An operating system is a program that acts as an interface between the software and the computer hardware.
- It is an integrated set of specialized programs used to manage overall resources and operations of the computer.
- It is a specialized software that controls and monitors the execution of all other programs that reside in the computer, including application programs and other system software.



Objectives of Operating System

The objectives of the operating system are –

- To make the computer system convenient to use in an efficient manner.
- To hide the details of the hardware resources from the users.
- To provide users a convenient interface to use the computer system.
- To act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources.
- To manage the resources of a computer system.
- To keep track of who is using which resource, granting resource requests, and mediating conflicting requests from different programs and users.
- To provide efficient and fair sharing of resources among users and programs.

Characteristics of Operating System

Here is a list of some of the most prominent characteristic features of Operating Systems –

- **Memory Management** – Keeps track of the primary memory, i.e. what part of it is in use by whom, what part is not in use, etc. and allocates the memory when a process or program requests it.
- **Processor Management** – Allocates the processor (CPU) to a process and deallocates the processor when it is no longer required.
- **Device Management** – Keeps track of all the devices. This is also called I/O controller that decides which process gets the device, when, and for how much time.

- **File Management** – Allocates and de-allocates the resources and decides who gets the resources.
- **Security** – Prevents unauthorized access to programs and data by means of passwords and other similar techniques.
- **Job Accounting** – Keeps track of time and resources used by various jobs and/or users.
- **Control Over System Performance** – Records delays between the request for a service and from the system.

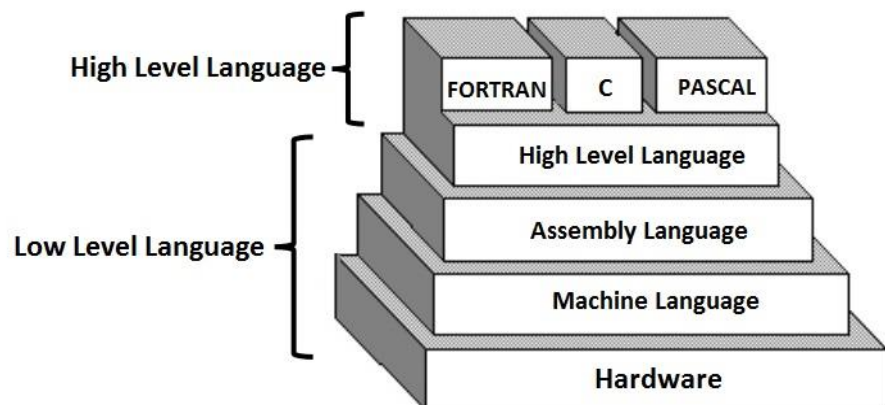
Computer Language and its Types

Introduction:

A language is the main medium of communicating between the Computer systems and the most common are the programming languages. As we know a Computer only understands binary numbers that is 0 and 1 to perform various operations but the languages are developed for different types of work on a Computer. A language consists of all the instructions to make a request to the system for processing a task. From the first generation and now fourth generation of the Computers there were several programming languages used to communicate with the Computer. Here we will go in the detail of the Computer language and its types.

Computer Language Description:

A Computer language includes various languages that are used to communicate with a Computer machine. Some of the languages like programming language which is a set of codes or instructions used for communicating the machine. Machine code is also considered as a computer language that can be used for programming. And also HTML which is a computer language or a markup language but not a programming language. Similarly, there are different types of languages developed for different types of work to be performed by communicating with the machine. But all the languages that are now available are categorized into two basic types of languages including Low-level language and High level language.



Computer Language and its Types

Low Level Language:

Low level languages are the machine codes in which the instructions are given in machine language in the form of 0 and 1 to a Computer system. It is mainly designed to operate and handle all the hardware and instructions set architecture of a Computer. The main function of the Low level language is to operate, manage and manipulate the hardware and system components. There are various programs and applications written in low level languages that are directly executable without any interpretation or translation. The most famous and the base

of all programming languages “C” and “C++” are mostly used Low level languages till today. Low level language is also divided into two parts are Machine language and Assembly language.

- **Machine Language** is one of the low-level programming languages which is the first generation language developed for communicating with a Computer. It is written in machine code which represents 0 and 1 binary digits inside the Computer string which makes it easy to understand and perform the operations. As we know a Computer system can recognize electric signals so here 0 stands for turning off electric pulse and 1 stands for turning on electric pulse. It is very easy to understand by the Computer and also increases the processing speed.

The main advantage of using Machine language is that there is no need of a translator or interpreter to translate the code, as the Computer directly can understand. But there are some disadvantages also like you have to remember the operation codes, memory address every time you write a program and also hard to find errors in a written program. It is a machine dependent and can be used by a single type of Computer.

- **Assembly Language** is the second generation programming language that has almost similar structure and set of commands as Machine language. Instead of using numbers like in Machine languages here we use words or names in English forms and also symbols. The programs that have been written using words, names and symbols in assembly language are converted to machine language using an Assembler. Because a Computer only understands machine code languages that's why we need an Assembler that can convert the Assembly level language to Machine language so the Computer gets the instruction and responds quickly.

The main disadvantage of this language is that it is written only for a single type of CPU and does not run on any other CPU. But its speed makes it the most used low level language till today which is used by many programmers.

High Level Language:

The high level languages are the most used and also more considered programming languages that helps a programmer to read, write and maintain. It is also the third generation language that is used and also running till now by many programmers. They are less independent to a particular type of Computer and also require a translator that can convert the high level language to machine language. The translator may be an interpreter and Compiler that helps to convert into binary code for a Computer to understand. There is various high level programming languages like C, FORTRAN or Pascal that are less independent and also enables the programmer to write a program.

The Compiler plays an important role on the Computer as it can convert to machine language and also checks for errors if any before executing. There are several high level languages that were used earlier and also now like COBOL, FORTRAN, BASIC, C, C++, PASCAL, LISP, Ada, Algol, Prolog and Java. It is user-friendly as the programs are written in English using words, symbols, characters, numbers that needs to be converted to machine code for processing.

Multiple Choice Questions and answers

1. The term 'Computer' is derived from.....
a. Latin b. German c. French d. Arabic
2. Who is the inventor of "Difference Engine"?
a. Allen Turing b. Charles Babbage c. Simur Cray d. Augusta Adaming
3. Who is the father of Computer?
a. Allen Turing b. Charles Babbage c. Simur Cray d. Augusta Adaming
4. Who is the father of Computer science?
a. Allen Turing b. Charles Babbage c. Simur Cray d. Augusta Adaming
5. Who is the father of personal computer?
a. Edward Robert b. Allen Turing c. Charles Babbage d. None of these
6. A CPU contains
**a. a card reader and a printing device b. an analytical engine and a control unit
c. a control unit and an arithmetic logic unit d. an arithmetic logic unit and a card reader**
7. Which of the following controls the process of interaction between the user and the operating system?
a. User interface b. Language translator c. Platform d. Screen saver
8. The first computers were programmed using
a. assembly language b. machine language c. source code d. object code
9. is a combination of hardware and software that facilitates the sharing of information between computing devices.
a. network b. peripheral c. expansion board d. digital device
10. Coded entries which are used to gain access to a computer system are called
a. Entry codes b. Passwords c. Security commands d. Code words
11. Which of the following statements is true ?
a. Minicomputer works faster than Microcomputer b. Microcomputer works faster than Minicomputer c. Speed of both the computers is the same d. The speeds of both these computers cannot be compared with the speed of advanced

12. You organize files by storing them in
a. archives b. folders c. indexes d. lists
13. What type of resource is most likely to be a shared common resource in a computer Network?
a. Printers b. Speakers c. Floppy disk drives d. Keyboards
14. Which device is required for the Internet connection?
a. Joystick b. Modem c. CD Drive d. NIC Card
15. What is a light pen?
a. A Mechanical Input device b. Optical input device c. Electronic input device d. Optical output device
16. UNIVAC is
a. Universal Automatic Computer b. Universal Array Computer c. Unique Automatic Computer d. Unvalued Automatic Computer
17. CD-ROM stands for
a. Compactable Read Only Memory b. Compact Data Read Only Memory c. Compactable Disk Read Only Memory d. Compact Disk Read Only Memory
18. ALU is
a. Arithmetic Logic Unit b. Array Logic Unit c. Application Logic Unit d. None of above
19. VGA is
a. Video Graphics Array b. Visual Graphics Array c. Volatile Graphics Array d. Video Graphics Adapter
20. IBM 1401 is
a. First Generation Computer b. Second Generation Computer c. Third Generation Computer d. Fourth Generation Computer
21. MSI stands for
a. Medium Scale Integrated Circuits b. Medium System Integrated Circuits c. Medium Scale Intelligent Circuit d. Medium System Intelligent Circuit
22. The capacity of 3.5 inch floppy disk is
a. 1.40 MB b. 1.44 GB c. 1.40 GB d. 1.44 MB
23. WAN stands for
a. Wap Area Network b. Wide Area Network c. Wide Array Net d. Wireless Area Network
24. MICR stands for
a. Magnetic Ink Character Reader b. Magnetic Ink Code Reader c. Magnetic Ink Cases Reader d. None
25. EBCDIC stands for
a. Extended Binary Coded Decimal Interchange Code b. Extended Bit Code Decimal Interchange Code c. Extended Bit Case Decimal Interchange Code d. Extended Binary Case Decimal Interchange Code
26. Which of the following is a part of the Central Processing Unit?
a. Printer b. Key board c. Mouse d. Arithmetic & Logic unit
27. CAD stands for
a. Computer aided design b. Computer algorithm for design c. Computer application in design d. Computer analogue design
- 4 32. The amount of vertical space between lines of text in a document is called
a. double-space b. line spacing c. single space d. vertical spacing

33. Example of non-numeric data is
a. Employee address b. Examination score c. Bank balance d. All of these
34. What is embedded system?
a. The programme which arrives by being wrapped in box. b. The programme which is the permanent part of the computer c. The computer which is the part of a big computer d. The computer and software system that control the machine
35. First page of Website is termed as-
a. Homepage b. Index c. JAVA script d. Bookmark
36. Is the appearance of typed characters?
a. Size b. Format c. Point d. Colour
37. When a file is saved for the first time
a. a copy is automatically printed b. it must be given a name to identify it c. it does not need a name d. it only needs a name if it is not going to be printed
38. Office LANS, which are scattered geographically on large scale, can be connected by the use of corporate
a. CAN b. LAN c. DAN d. WAN
39. Where are data and programme stored when the processor uses them?
a. Main memory b. Secondary memory c. Disk memory d. Programme memory
40. represents raw facts, where-as..... is data made meaningful.
a. Information, reporting b. Data, information c. Information, bits d. Records, bytes
41. What characteristic of read-only memory (ROM) makes it useful?
a. ROM information can be easily updated. b. Data in ROM is non-volatile, that is, it remains there even without electrical power. c. ROM provides very large amounts of inexpensive data storage. d. ROM chips are easily swapped between different brands of computers.
42. What do you call the programs that are used to find out possible faults and their causes?
a. operating system extensions b. cookies c. diagnostic software d. boot diskettes
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43. Which programming languages are classified as low level languages?
a. BASIC, COBOL, Fortran b. Prolog c. C, C++ d. Assembly languages
44. Which of the following is not anti- viruses' software?
a. NAV b. F-Prot c. Oracle d. McAfee
45. Which device is required for the Internet connection?
a. Joystick b. Modem c. CD Drive d. NIC Card
46. What does DMA stand for?
a. A. Distinct Memory Access b. Direct Memory Access c. Direct Module Access d. Direct Memory Allocation
47. Which of the following is a storage device?
a. Tape b. Hard Disk c. Floppy Disk d. All of the above
48. When did John Napier develop logarithm?
a. 1416 b. 1614 c. 1641 d. 1804
49. A normal CD- ROM usually can store up to _____ _data?
a. 680 KB b. 680 Bytes c. 680 MB d. 680 GB
50. MIS is designed to provide information needed for effective decision making by?
a. Consumers b. Workers c. Foremen d. Managers

51. What is a light pen?
a. Mechanical Input device b. Optical input device c. Electronic input device d. Optical output device
52. BCD is
a. Binary Coded Decimal b. Bit Coded Decimal c. Binary Coded Digit d. Bit Coded Digit
53. ASCII stands for
a. American Stable Code for International Interchange b. American Standard Case for Institutional Interchange c. American Standard Code for Information Interchange d. American Standard Code for Interchange Information School of Distance Education Fundamentals of Computers Page 6
54. Which of the following is first generation of computer?
a. EDSAC b. IBM-1401 c. CDC-1604 d. ICL-2900
55. Chief component of first generation computer was
a. Transistors b. Vacuum Tubes and Valves c. Integrated Circuits d. None of above
56. FORTRAN is
a. File Translation b. Format Translation c. Formula Translation d. Floppy Translation
57. EEPROM stands for
a. Electrically Erasable Programmable Read Only Memory b. Easily Erasable Programmable Read Only Memory c. Electronic Erasable Programmable Read Only Memory d. None of the above
58. Second Generation computers were developed during
a. 1949 to 1955 b. 1956 to 1965 c. 1965 to 1970 d. 1970 to 1990
59. The computer size was very large in
a. First Generation b. Second Generation c. Third Generation d. Fourth Generation
60. Microprocessors as switching devices are for which generation computers
a. First Generation b. Second Generation c. Third Generation d. Fourth Generation
61. Which of the following devices can be used to directly image printed text?
a. OCR b. OMR c. MICR d. All of above
62. The output quality of a printer is measured by
a. Dot per inch b. Dot per sq. inch c. Dots printed per unit time d. All of above
63. In analogue computer
a. Input is first converted to digital form b. Input is never converted to digital form c. Output is displayed in digital form d. All of above
64. In latest generation computers, the instructions are executed
a. Parallel only b. Sequentially only c. Both sequentially and parallel d. All of above
65. Who designed the first electronics computer – ENIAC?
a. Van-Neumann b. Joseph M. Jacquard School of Distance Education Fundamentals of Computers Page 7 c. J. Presper Eckert and John W Mauchly d. All of above
66. Who invented the high level language “C”?
a. Dennis M. Ritchie b. Niklaus Wirth c. Seymour Papert d. Donald Kunth
67. Personnel who design, program, operate and maintain computer equipment refers to
a. Console-operator b. Programmer c. Peopleware d. System Analyst
68. When did arch rivals IBM and Apple Computers Inc. decide to join hands?
a. 1978 b. 1984 c. 1990 d. 1991

69. Human beings are referred to as Homosapinens, which device is called Sillico Sapiens?
a. Monitor b. Hardware c. Robot d. Computer
70. An error in software or hardware is called a bug. What is the alternative computer jargon for it?
a. Leech b. Squid c. Slug d. Glitch
71. Modern Computer are very reliable but they are not
a. Fast b. Powerful c. Infallible d. Cheap
72. What is the name of the display feature that highlights are of the screen which requires operator attention?
a. Pixel b. Reverse video c. Touch screen d. Cursor
73. Personal computers use a number of chips mounted on a main circuit board. What is the common name for such boards?
a. Daughter board b. Motherboard c. Father board d. Breadboard
74. In most IBM PCs, the CPU, the device drives, memory expansion slots and active components are mounted on a single board. What is the name of this board?
a. Motherboard b. Breadboard c. Daughter board d. Grandmother board
75. What is meant by a dedicated computer?
a. Which is used by one person only b. Which is assigned one and only one task c. Which uses one kind of software d. Which is meant for application software
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76. The system unit of a personal computer typically contains all of the following except:
a. Microprocessor b. Disk controller c. Serial interface d. Modem
77. A computer program that converts an entire program into machine language is called a/an
a. Interpreter b. Simulator c. Compiler d. Commander
78. A computer program that translates one program instructions at a time into machine language is called a/an
a. Interpreter b. CPU c. Compiler d. Simulator
79. A small or intelligent device is so called because it contains within it a
a. Computer b. Microcomputer c. Programmable d. Sensor
80. A fault in a computer program which prevents it from working correctly is known as
a. Boot b. Bug c. Biff d. Strap
81. A self-replicating program, similar to a virus which was taken from
a 1970s science fiction novel by John Bruner entitled the Shockwave Rider is a. Bug b. Vice c. Lice d. Worm
82. A state. is a bi-stable electronic circuit that has
a. Multivibrator b. Flip-flop c. Logic gates d. laten
83. Unwanted repetitious messages, such as unsolicited bulk e-mail is known as
a. Spam b. Trash c. Calibri d. Courier
84. DOS stands for
a. Disk Operating System b. Disk operating session c. Digital Operating System d. Digital Open system
85. Who is the chief of Microsoft
a. Babbage b. Bill Gates c. Bill Clinton d. none of these
86. Which of the following are input devices?

- a. Keyboard b. Mouse c. Card reader d. Any of these
87. Examples of output devices are
a. Screen b. Printer c. Speaker d. All of these
88. Which of the following is also known as brain of computer
a. Control unit b. Central Processing unit c. Arithmetic and language unit d. Monitor
89. IBM stands for
a. Internal Business Management b. International Business Management c. International Business Machines d. Internal Business Machines
90. translates and executes program at run time line by line
a. Compiler b. Interpreter c. Linker d. Loader
- School of Distance Education Fundamentals of Computers Page 9
91. is an OOP principle
a. Structured programming b. Procedural programming c. Inheritance d. Linking
92. COBOL is widely used in application s
a. Commercial b. Scientific c. Space d. Mathematical
93. RAM stands for a. Random origin money b. Random only memory c. Read only memory d. Random access memory
94. 1 Byte =?
a. 8 bits b. 4 bits c. 2 bits d. 9 bits
95. SMPS stands for
a. Switched mode Power Supply b. Start mode power supply c. Store mode power supply d. Single mode power supply
96. The device used to carry digital data on analogue lines is called as a. Modem b. Multiplexer c. Modulator d. Demodulator
97. VDU is also called
a. Screen b. Monitor c. Both 1 & 2 d. printer
98. BIOS stands for
a. Basic Input Output system b. Binary Input output system c. Basic Input Off system d. all the above
99. Father of “C ‘programming language
a. Dennis Ritchie b. Prof John Keenly c. Thomas Kurtz d. Bill Gates
100. The instructions that tell a computer how to carry out the processing tasks are referred to as computer.....
a. programs b. processors c. input devices d. memory modules
101. An area of a computer that temporarily holds data waiting to be processed is.....
a. CPU b. Memory c. Storage d. File
102. is the key to close a selected drop -down list; cancel a command and close a dialog box.
a. TAB b. SHIFT c. ESC d. F10
103. is the key we use to run the selected command.
a. SHIFT b. TAB c. ENTER d. CTRL
104. Is the functional key to display save-as box?
a. F5 b. F6 c. F9 d. F12

105. Data becomes when it is presented in a format that people can understand and use
a. processed b. graphs c. information d. presentation
106. The term designates equipment that might be added to a computer system to enhance its functionality.
a. digital device b. system add-on c. disk pack d. peripheral device
107. A is a microprocessor -based computing device.
a. personal computer b. mainframe c. workstation d. server
108. RAM can be treated as the for the computer's processor
a. factory b. operating room c. waiting room d. planning room
109. Which of the following are the functions of a operating system
a. Allocates resources b. Monitors Activities c. Manages disks and files d. All of the above
110. To move a copy of file from one computer to another over a communication channel is called?
a. File transfer b. File encryption c. File modification d. File copying
111. The primary function of the is to set up the hardware and load and start an operating system
a. System Programs b. BIOS c. CP d. Memory
112. What kind of memory is both static and non -volatile?
a. RAM b. ROM c. BIOS d. CACHE
113. is computer software designed to operate the computer hardware and to provide platform for running application software
a. Application software b. System software c. Software d. Operating system
114. The is the amount of data that a storage device can move from the storage medium to the Computer per second
a. data migration rate b. data digitizing rate c. data transfer rate d. data access rate
115. A device, which is not connected to CPU, is called as
a. land-line device b. On-line device c. Off-line device d. Device
116. What is the other name for programmed chip?
a. RAM b. ROM c. LSIC d. PROM
117. On-line real time systems become popular in generation
a. First Generation b. Second Generation c. Third Generation d. Fourth Generation
118. You use a(n), such as a keyboard or mouse, to input information a. output device b. input device c. storage device d. processing device
119. is the ability of a device to "jump" directly to the requested data
a. Sequential access b. Random access c. Quick access d. All of the above
120. provides process and memory management services that allow two or more tasks, jobs, or programs to run simultaneously
a. Multitasking b. Multithreading c. Multiprocessing d. Multicompetent
121. The task of performing operations like arithmetic and logical operations is called.....
a. Processing b. Storing c. Editing d. Sorting
122. ALU and Control Unit jointly known as
a. RAM b. ROM c. CPU d. PC
123. RAM is an example of

- a. Secondary memory b. Primary memory c. Main memory d. Both (1) and (2)
124. Magnetic disk is an example of
a. Secondary memory b. Primary memory c. Main memory d. Both (1) and (2)
125. Which one of the following is NOT a computer language
a. MS-Excel b. BASIC c. COBOL d. C++
126. RAM is also called as
a. Read / Write Memory b. Long Memory c. Permanent Memory d. Primary Memory
127. Store data or information temporarily and pass it on as directed by the control unit
a. Address b. Register c. Number d. Memory
128. Select the Odd one
a. Operating system b. Interpreter c. Compiler d. Assembler
129. A is an additional set of commands that the computer displays after you make a selection from the main menu
a. dialog box b. submenu c. menu selection d. All of the above
130. COBOL is an acronym for.....
a. Common Business Oriented Language b. Computer Business Oriented Language c. Common Business Operated Language d. Common Business Organized Language
131. All of the following are examples of real security and privacy risks EXCEPT
a. hackers b. Spam c. Viruses d. identity theft
132. Which of the following is NOT one of the four major data processing functions of a computer?
a. gathering data b. processing data into information c. analyzing the data or information d. storing the data or information
133. All of the following are examples of storage devices EXCEPT:
a. hard disk drives b. printers c. floppy disk drives d. CD drives
134. The CPU and memory are located on the :
a. expansion board b. motherboard c. storage device d. output device
135. is the science that attempts to produce machines that display the same type of intelligence that humans do
a. Nanoscience b. Nanotechnology c. Simulation d. Artificial intelligence (AI)
136. Servers are computers that provide resources to other computers connected to a :
a. networked b. mainframe c. supercomputer d. client
137. When creating a computer program, the designs the structure of the program
a. End user b. System Analyst c. Programmer d. All of the above
138. A computer program that converts an entire program into machine language at one time is called a/ an
a. Interpreter b. simulator c. characters d. compiler
139. Computers process data into information by working exclusively with :
a. multimedia b. word c. numbers d. characters
140. The difference between people with access to computers and the Internet and those without this access is known as the :
a. digital divide b. Internet divide c. Web divide d. E-illiteracy
141. Computers manipulate data in many ways, and this manipulation is called.....
a. upgrading b. processing c. batching d. utilizing

142. The ability to recover and read deleted or damaged files from a criminal's computer is an example of a law enforcement specialty called:
a. robotics b. simulation c. computer forensics d. animation
143. Where does most data go first with in a computer memory hierarchy ?
a. RAM b. ROM c. BIOS d. CACHE
144. The.....data mining technique derives rules from real-world case examples.
a. Rule discover b. Signal processing c. Neural nets d. Case-based reasoning
145. are used to identify a user who returns to a Website
a. Cookies b. Plug-ins c. Scripts d. ASPs
146. Codes consisting of lines of varying widths or lengths that are computer-readable are known as- a. an ASCII code b. a magnetic tape c. an OCR scanner d. a bar code
147. Why is it unethical to share copyrighted files with your friends? a. It is not unethical, because it is legal. b. It is unethical because the files are being given for free. c. Sharing copyrighted files without permission breaks copyright laws. d. It is not unethical because the files are being given for free.
148. Reusable optical storage will typically have the acronym-
a. CD b. DVD c. ROM d. RW
149. The most common type of storage devices are-
a. Steel b. optical c. magnetic d. flash
150. A device that connects to a network without the use of cables is said to be-
a. Distributed b. free c. centralized d. none of these
151. A person who used his or her expertise to gain access to other people's computers to get information illegally or do damage is a-
a. Hacker b. spammer c. instant messenger d. programmer
152. To access properties of an object, the mouse technique to use is-
a. Dragging b. dropping c. right-clicking d. shift-clicking
153. A DVD is an example of a (n)-
a. hard disk b. optical disc c. output device d. solid-state storage device
154. . The process of transferring files from a computer on the Internet to your computer is called a. Downloading b. uploading c. FTP d. JPEG
155. is the process of dividing the disk into tracks and sectors.
a. Tracking b. Formatting c. Crashing d. Allotting
156. . Help Menu is available at which button?
a. End b. Start c. Turnoff d. Restart
157. The technology that stores only the essential instructions on a microprocessor chip and thus enhances its speed is referred to as
a. CISC b. RISC c. CD-ROM d. Wi-Fi
158. Which is not a basic function of a computer?
a. Store data b. Accept input c. Process data d. Copy text
159. ASCII is a coding system that provides
a. 256 different characters b. 512 different characters c. 1024 different characters d. 128 different characters

160. Which part of the computer is directly involved in executing the instructions of the computer program? a. The scanner b. The main storage c. The secondary storage d. The processor
161. When a computer is switched on, the booting process performs a. Integrity Test b. Power-On Self-Test c. Correct Functioning Test d. Reliability Test
162. A computer system that is old and perhaps not satisfactory is referred to as a(n) a. Ancient system b. Historical system c. Age old system d. Legacy system
163. Which of the following is not a binary number? a. 001 b. 101 c. 202 d. 110
164. Which of the following does not store data permanently? a. ROM b. RAM c. Floppy Disk d. Hard Disk
165. Which of the following is the smallest storage? a. Megabyte b. Gigabyte c. Terabyte d. None of these
166. Which of the following contains permanent data and gets updated during the processing of transactions? a. Operating System File b. Transaction file c. Software File d. Master file
167. Which of the following helps to protect floppy disks from data getting accidentally erased? a. Access notch b. Write-protect notch c. Entry notch d. Input notch
168. A modem is connected to a. a telephone line b. a keyboard c. a printer d. a monitor
169. Large transaction processing systems in automated organisations use a. Online processing b. Batch Processing c. Once-a-day Processing d. End-of-day processing
170. In a computer, most processing takes place in
a. Memory b. RAM c. motherboard d. CPU
171. Which of the following is not a storage medium?
a. Hard disk b. Flash drive c. DVD d. scanner
172. The computer abbreviation KB usually means
a. Key Block b. Kernel Boot c. Kilo Byte d. Kit Bit
173. The typical computer criminal is a(n):
a. Young hacker. b. Trusted employee with no criminal record. c. Trusted employee with a long, but unknown criminal record. d. Overseas young cracker.
174. The common name for the crime of stealing passwords is:
a. Jacking. b. Identity theft. c. Spoofing. d. Hacking.
175. Collecting personal information and effectively posing as another individual is known as the crime of: a. Spooling. b. Identity theft. c. Spoofing. d. Hacking.
176. Malicious software is known as:
a. Badware. b. Malware. c. Maliciousware. d. Illegalware.
177. A program that performs a useful task while simultaneously allowing destructive acts is a:
a. Worm. b. Trojan horse. c. Virus. d. Macro virus.
178. An intentionally disruptive program that spreads from program to program or from disk to disk is known as a:
a. Trojan horse. b. Virus. c. Time bomb. d. Time-related bomb sequence.
179. In 1999, the Melissa virus was a widely publicised:
a. E-mail virus. b. Macro virus. c. Trojan horse. d. Time bomb.
180. What type of virus uses computer hosts to reproduce itself?
a. Time bomb b. Worm c. Melissa virus d. Macro virus
181. The thing that eventually terminates a worm virus is a lack of:
a. Memory or disk space. b. Time. c. CD drives space. d. CD-RW.

182. When a logic bomb is activated by a time-related event, it is known as a:
a. Time-related bomb sequence. b. Virus. c. Time bomb. d. Trojan horse.
183. A logic bomb that was created to erupt on Michelangelo's birthday is an example of a:
a. Time-related bomb sequence. b. Virus. c. Time bomb. d. Trojan horse.
184. What is the name of an application program that gathers user information and sends it to someone through the Internet?
a. A virus b. Spybot c. Logic bomb d. Security patch
185. ----- is the measurement of things such as fingerprints and retinal scans used for security access.
a. Biometrics b. Bio measurement c. Computer security d. Smart weapon machinery
186. What is the most common tool used to restrict access to a computer system?
a. User logins b. Passwords b. Computer keys d. Access-control software
187. Hardware or software designed to guard against unauthorized access to a computer network is known as a(n):
a. Hacker-proof program. b. Firewall. c. Hacker-resistant server. d. Encryption safe wall.
188. The scrambling of code is known as:
a. Encryption. b. a firewall. c. Scrambling. d. Password proofing.
189. To prevent the loss of data during power failures, use a(n):
a. Encryption program. b. Surge protector. c. Firewall. d. UPS.
190. -----Is defined as any crime completed through the use of computer technology.
a. Computer forensics b. Computer crime c. Hacking d. Cracking
191. ----- refers to electronic trespassing or criminal hacking.
a. Cracking b. Jacking c. Spoofing d. Smarming
192. The first electronic computer was developed by
a. J.V. Attansoff b. Bill Gates c. Simur Cray d. Winton Serf
193. Snowbol is an/a-----
a. Operating system b. HLL c. Software d. Search engine
194. Switching device of fifth generation computer is-----
a. Vacuum tubes b. Transistors c. IC d. VLSI
195. ----- computers operates essentially by counting a. Portable computer b. Hybrid computer c. Analog computer d. Digital computer
196. ----- computer is small general purpose microcomputer, but larger than portable computer
a. Hybrid b. Digital c. Desktop d. Laptop
197. Cathode Ray Tube is a form of.....
a. Keyboard b. Mouse c. Monitor d. Mother board
198. Trackball is a.....
a. Input device b. Output device c. Programming language d. Software
199. computer is a medium sized computer
a. Micro b. Mainframe c. Super d. Mini
200. computer are of large size
a. Micro b. Mainframe c. Super d. Mini
201. Note book, laptop, palm, hand-held computers are coming under the category of..... computer

- a. Digital computer b. Mainframe computer c. Portable computer d. Hybrid computer
202. Light pen and joystick are.....
- a. Algorithm b. Input devices c. Output devices d. Portals
203. Touch Screen is.....
- a. Input device b. Output device c. Both a & b above d. None of these
204. printer is the cheapest in terms of price and operating cost
- a. Inkjet b. Laser c. Thermal d. Dot matrix
205. printer is a non-impact printer and is quite in working
- a. Inkjet b. Laser c. Thermal d. Dot matrix
206. are high-end printers
- a. Inkjet b. Laser c. Thermal d. Dot matrix
207. are used for plotting graphs and design on papers
- a. Trackball b. Joystick c. Light pen d. Plotters
208. Daisy wheel, Drum, chain etc are the
- a. Flow chart b. Mouse c. Key board d. Printers
209. are specific to users' needs
- a. System software b. Application software c. Assemblers d. Compilers
210. Joshy, Perfumes are examples of.....
- a. Operating system b. Computer languages c. Computer viruses d. Web portals
211. Which of the following is/ are operating systems
- a. Windows b. Unix c. OS/2 d. All of these
212. "MAN" stands for
- a. Maximum Area Network b. Minimum Area Network c. Main Area Network d. Metropolitan Area Network
213. Which of the following is a network topology
- a. LAN b. WAN c. MAN d. BUS
214. Which of the following is a type of network
- a. Ring b. Bus c. Star d. PAN
215. VOIP stands for.....
- a. Voice over IP b. Video over IP c. Viruses over IP d. Virtual over IP
216. The first web browser is
- a. Mosaic b. Netscape c. Internet explorer d. Collabra
217. LAN stands for.....
- a. Limited Area Network b. Logical Area Network c. Local Area Network d. Large Area Network
218. are set of rules and procedures to control the data transmission over the internet
- a. IP address b. Domains c. Protocol d. Gateway
219. NOS stands for
- a. Node operating system b. Non-open software c. Network Operating system d. Non-operating software
220. are system software to facilitate editing of text and data
- a. MS Word b. Editors c. PowerPoint d. MS publisher
221. Computers, combine both measuring and counting, are called :
- a. Analog b. Digital c. Hybrid d. All of these
222. In world today, most of the computers are :
- a. Digital b. Hybrid c. Analog d. Complex
223. Physical structure of computer is called :

- a. Software b. Hardware c. Human ware d. All of these
224. In which type of computer, data are represented as discrete signals.
- a. Analog computer b. Digital computer c. both d. Hybrid Computer
225. Which of the following is available in the form of a PC now?
- a. Mainframe b. Microcomputer c. Minicomputer d. Both (B) & (C)
226. PARAM is an example of:
- a. Super computer b. PC c. Laptop d. PDA